

The Effect of Board Characteristics on Carbon Emission Disclosure

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Abstract: The aim of this research is to examine and explain how the influence of the board characteristics commissioners on carbon disclosure by using controls variables such as Company Size, Profitability and Leverage. The population in this study is the manufacturing industry sector companies listed on the Indonesia Stock Exchange during the 2017-2019 periods. A sample of 72 companies was taken using the purposive sampling method. The analysis used is multiple linear regressions with the E-views version 11. The results of this study indicate that board independence has a significant effect on carbon emissions disclosure while company board size, board gender and board nationality diversity have no significant effect on carbon emission disclosure.

Keywords: Corporate Governance, Board Size, Board Independence, Board Gender, Board Nationality, Carbon Emission Disclosure.

1. INTRODUCTION

The Earth Summit in 1992 and the Kyoto protocol in 1997, led to global issues regarding climate change and other related environmental risks, the theme of sustainability and sustainable development has become very important. Non-financial disclosures are becoming increasingly popular, as they can meet the increasing information needs of various stakeholders. Since traditional financial reports cannot provide comprehensive accountability, several frameworks and guidelines to facilitate non-financial information disclosure has been (Manes-Rossi *et al.*, 2018). The company's efforts to reduce and control carbon emissions are through carbon emissions disclosure. Carbon emissions disclosure as one of the non-financial information included in voluntary disclosure in the company's sustainability report in which there are social and environmental aspects of responsibility (corporate social responsibility). The sustainability report is a reflection that describes the extent of corporate social responsibility towards stakeholders (Iskandar & Efita 2016). This non-financial information has been regulated in PSAK No. 1 (revised 2018) paragraph fourteen which states that the presentation of financial statements states that companies can also present additional reports (Ikatan Akuntan Indonesia 2018). This can be interpreted as an important door for voluntary disclosure, especially for industries where the environment plays an important role. Go public companies are responsible for implementing Corporate Governance, one of which is transparency. This transparency is the basis for the company to report all aspects that affect the continuity of the company's operations. Analyzing corporate governance means considering the characteristics of the board and the composition of the board, namely the number of independent boards, the term of the board, the size of the board, and the diversity of the board in terms of gender, age, ethnicity, nationality, and educational background. (Cucari *et al.*, 2018). The characteristics of the board of commissioners used as independent variables are the size of the board of commissioners, the independent board of commissioners, gender diversity, and board nationality. Meanwhile, carbon emissions disclosure is the dependent variable. Firm size, profitability, and leverage as control variables.

Researchers use agency theory and regulatory theory to determine the effect of the characteristics of the board of commissioners on carbon emissions disclosure. Agency theory defines agency relationship as an employment contract relationship made between shareholders (principals) who use the services of agents (managers) in carrying out business activities and working for the interests of the principal (shareholders), including the delegation of decision-making authority from the principal (shareholders) to agent (manager) (Jensen & Meckling, 1976). The existence of a contract between the principal and the agent with the delegation of authority raises the possibility of the agent making business decisions that benefit him (opportunistic behavior). The existence of a contract between the principal and agent with authorized delegation raises the possibility of an agent make business decisions that benefit him (opportunistic behavior) (Setiany *et al.* 2018). In order for agents to act in accordance with the interests of the principle, good governance is needed (Gutterman 2020). Regulatory Theory states that

regulation is given in response to public demand for improvements in inefficient market prices. Where this theory provides protection and goodness for the general public (Belkaoui 2017). There are regulations regarding social and environmental disclosures that have been set by financial accounting standards to protect the interests of the public and groups.

The purpose of this study is to find answers to the following questions: (1) Does board size affect on carbon emission disclosure? (2) Does board independence affect on carbon emissions disclosure? (3) Does board gender diversity affect on carbon emission disclosure? (4) Does board nationality diversity affect of carbon emissions disclosure?

2. RESEARCH BACKGROUND AND HYPOTHESIS DEVELOPMENT

Iredele & Moloi, (2020) explain that board size has a significant effect on carbon emissions disclosure. Research conducted by Elsayih *et al*, (2018) stated that board independence has a significant effect on the disclosure of carbon, Ben-Amar *et al*, (2015) stated that gender diversity has a significant effect on the carbon emissions disclosure, and research conducted by Kılıç and Kuzey (2019) states that national diversity has a significant effect on the disclosure of carbon emissions. There is also very little research investigating the impact of corporate governance characteristics (e.g. board size, board independence, gender diversity, and national diversity on corporate reporting practices relative to carbon emissions(Kılıç and Kuzey 2019). This motivation makes researchers want to study and explain more deeply how the characteristics of the board of commissioners influence the voluntary disclosure of carbon.

H1: Board Size Has Significant Effects on Carbon Emission Disclosure

The board of commissioners has must carry out supervision and provide advice to the board of directors. The existence of a growing commissioner can provide oversight and ensure that the directors act in the interests of the principal according to the agency according to Pangestuet *et al* (2019). The large size of the board of commissioners indicates more effective supervision, so that management and shareholders can monitor each other and avoid the emergence of information asymmetry. Disclosure of carbon emissions can show the company's seriousness in addressing environmental impacts. In line with research by Iredele & Moloi, (2020), Iswati & Setiawan, (2020), Nasih *et al*, (2019), Yunus *et al*, (2016) stated that board size has a significant effect on carbon emission disclosure.

H2: Board Independence Has Significant Effects on Carbon Emission Disclosure

Independent commissioners have the main responsibility to encourage the implementation of good corporate governance principles. Its role in the company ensures transparency and disclosure of the company's financial statements, seeks fair treatment of minority shareholders and other stakeholders, strives for company compliance with applicable laws and regulations and ensures accountability of company organs, such as the general meeting of shareholders. a higher proportion of independent commissioners are expected to monitor management more effectively and provide more objective feedback on the company's operations and performance(Liao *et al*, 2015). In addition to maintaining its independence, the independent board of commissioners is also expected to expand the company's sensitivity in dealing with social demands, especially in responding to issues related to the environment. (Trufvisa *et al*, 2019). In line with research by Zanra *et al*. (2020), Ararat and Sayedy (2019), Niza and Ratmono (2019), Krishnamurti & Velayutham (2018) and Elsayih *et al*, (2018) stated that board independence has a significant effect on carbon emission disclosure.

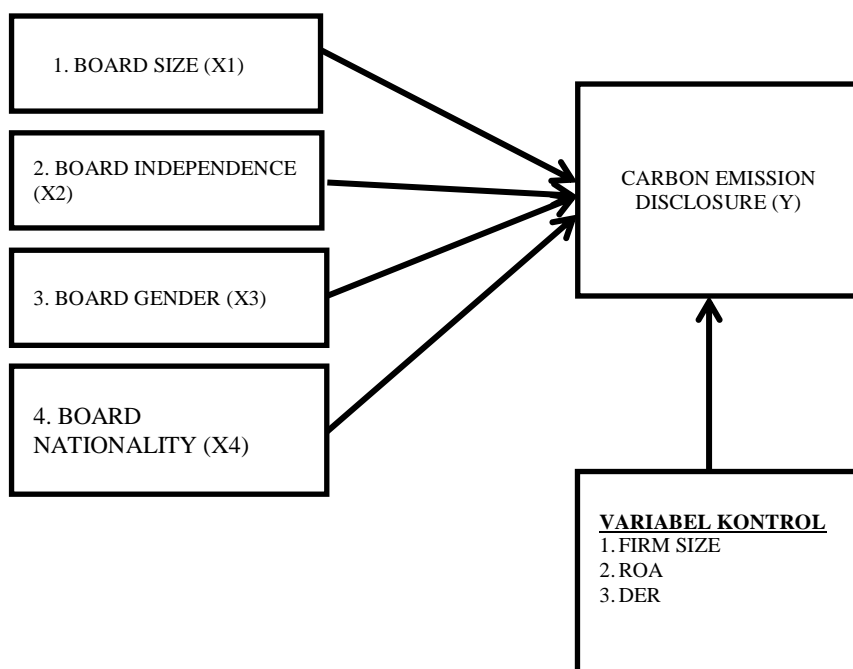
H3: Board Gender Has Significant Effects on Carbon Emission Disclosure

Gender diversity in the board is very important to carry out its oversight function, because the more diverse the board has a combination of capacities and experience which is an important factor in the effectiveness of the board (Choiriah 2020). According to Hollindale *et al*, (2019) This suggests that companies with female in boards have higher quality carbon emission disclosure, because women are also perceived as more ethical, risk-averse and long-term oriented (Ararat and Sayedy 2019). In line with research by Saraswati *et al*, (2021), Tingbani *et al*, (2020), Grediani *et al*, (2020), Hossain *et al*, (2017) Ben-Amar *et al*, (2015) stated that board gender diversity has a significant effect on carbon emission disclosure.

H4: Board Nationality Has Significant Effects on Carbon Emission Disclosure

National diversity brings diverse perspectives, ideas and information into discussion within the board of commissioners, and enhances the entity's ability to reach more effective decisions (Trufvisa *et al.* 2019). Organizational management will be better if the board has heterogeneous members, so that they can to complement each other's competence and credibility (Syamsudin, *et al.*,2017). No previous research has analyzed national diversity in councils regarding carbon emission disclosure (Kılıç and Kuzey 2019)but the variable of National Diversity of the Board of Commissioners has been researched by other disclosure variables such as research Khan et al., (2019), Farida, (2020) and Purnomo & Rizki, (2020)which states the results confirm that the board's national diversity affects CSR disclosure. Research conducted by Kılıç & Kuzey, (2019)stated that the national diversity of the board of commissioners has a significant effect on carbon emissions disclosure.

Referring to previous research, the following research hypotheses are formulated as follows:



3. METHODOLOGY, DATA AND RESEARCH MODELS

3.1 Methodology

This research is a quantitative study by conducting empirical studies on manufacturing companies listed on the Indonesia Stock Exchange (IDX) during the 2017-2019 periods.

3.2 Data Analysis

The sampling technique in this study used the purposive sampling method, namely the sample determined by the researcher based on certain criteria to obtain a representative sample. From 182 manufacturing companies in the 2017-2019 periods, a sample of 72 companies was selected according to the research objective criteria.

3.3 Models

The variable in this study is carbon emission disclosure as the dependent variable, while board size, board independence, board gender diversity and board nationality diversity are independent variables. Firm size, profitability and *leverage* as control variables. The operational definition of variables can be seen in the following table:

Table 3.3 List of Research Variable Operationalization

No	Variables	Indicator	Scale
1	Carbon Emission Disclosure (Y)	Percentage of the total items disclosed by the company to the total items (i.e. 20 items) in the disclosure index.	Ratio
2	Board Size (X1)	Board Size is measured by the total number of members of the company's management.	Ratio
3	Board Independence (X2)	Board independence is calculated from the number of independence commissioners divided by the number of commissioners	Ratio
4	Board Gender Diversity (X3)	Board Gender Diversity is calculated from the number of women divided by the number of commissioners	Ratio
5	Board Nationality (X4)	Diversity is calculated using the Blau Index	Ratio
6	Firm Size (Z1)	Firm size is measured by the natural logarithm of total assets.	Ratio
8	Profitability (Z2)	Profitability is calculated from net profit divided by total assets	Ratio
8	Leverage (Z3)	Leverage is measured by the ratio of total liabilities to total equity	Ratio

Research Model:

$$CDI = \alpha + \beta_1 BSIZE_{it} + \beta_2 BIND + \beta_3 BGEN + \beta_4 BNAT_t + \beta_5 SIZE + \beta_6 ROA + \beta_6 LEV + \epsilon$$

Which: α : Constant; β_1, β_2 : Coefficient; ϵ : Error

4. RESEARCH RESULTS

4.1 Descriptive Statistics

Table 4.1 illustrates the maximum, minimum, standard deviation and number of observations for all variables seen in this study.

Table 4.1 Analysis Statistic Descriptive

	BSIZE	BIND	BGEN	BNAT	SIZE	LEV	ROA	CDI
Mean	4.523148	0.405000	0.094366	0.193016	0.288542	5.781801	0.052287	0.165972
Median	4.000000	0.400000	0.000000	0.000000	0.286043	0.904178	0.035465	0.150000
Maximum	11.00000	0.800000	0.666667	0.843750	0.324730	786.9311	0.920997	0.450000
Minimum	2.000000	0.200000	0.000000	0.000000	0.213592	-4.939966	-0.401425	0.050000
Std. Dev.	1.875031	0.098699	0.159016	0.263820	0.019014	53.87213	0.125426	0.093196
Observations	216	216	216	216	216	216	216	216

Based on table 2 of the Independent Variables Size of the Board of Commissioners (X1), the mean is 4.523148, the maximum value is 11, the minimum value is 2, and the standard deviation is 1.875031. The composition of the Independent Board of Commissioners (X2) obtained a mean of 0.405, a maximum value of 0.8, and a minimum value of 0.2 and a standard deviation of 0.098699. Gender Diversity of the Board of Commissioners (X3) obtained a mean of 0.094366, a maximum value of 0.666667, a minimum value of 0, and a standard deviation of 0.159016 Nationality of a Board of Commissioners(4) obtained a mean of 0.193016, a maximum value of 0.843750, a minimum value of 0 , and standard deviation 0.263820. The control variable Firm Size (Z1) obtained a mean of 0.288542, a maximum value of 0.324730, and a minimum value of 0.213592 and a standard deviation of 0.019014. Profitability (Z2) obtained mean 0,052287, the maximum value is 0.920997, the minimum value is 0.125426 and the standard deviation is 0.125426. Leverage (Z3) obtained mean 5.781801, maximum value 786.9311, minimum value -4.939966 and standard deviation 53.87213. Dependent Variable of Carbon Emission Disclosure (Y) obtained mean 0.165972, maximum value 0.45, value minimum 0.05 and standard deviation 0.093196.

The appropriate Panel Data Regression Model is the Random Effect Model.

Tabel 4.2. Hypotheses - Random Effect Model

Hypotheses	Independent Variables	Random Effect Model Results		
		β	t-Statistic	P-value
Board Size has effect on Carbon Emission Disclosure	Board Size	0,004717	1,187243	0,2365
Board Independence has effect on Carbon Emission Disclosure	Board Independence	0,118779	2,629076	0,0092
Board Gender has effect on Carbon Emission Disclosure	Board Gender	0,033524	8,884527	0,3744
Board Nationality has effect on Carbon Emission Disclosure	Board Nationality	-0,018175	-0,670792	0,5031
Control Variable	Size	0,490444	2.943444	0,0036
	Profitabilitas	0,116711	3.887520	0,0001
	Leverage	4,96E-05	1,056185	0,2921
Statistical Model	R-Squared		0,170236	
	Adjusted R-Squared		0,142311	
	Prob(F-statistic)		0,000001	

Based on table 4.2, the results of panel data regression Random Effect Model with the dependent variable Carbon Emissions Adjusted R-Square number in Weighted Statistics is 0.142311. This means that the independent variable in this model can to explain the dependent variable by 14.23% so that the remaining 85.77% can be influenced by variables outside this model. The better R-Squared value in the weighted statistics is 0.170236 or 17.12%, indicating that the influence of all independent variables on firm value is not strong enough because the score is <50%.

The results of panel data regression Random Effect Model dependent variable Carbon Emission Disclosure Prob value (F-statistics) 0.00001 <0.05, meaning that the suitability of the Random Effect regression model used together affects the variables BSIZE, BIND, BGEN, BNAT on CDI.

4.3 Discussion

The results of the regression hypothesis (H1) obtained that the size of the board of commissioners on carbon emissions disclosure in the p-value significant test of 0.2365 is greater than $= 0.05$, so it can be said that BSIZE has no effect on carbon emissions. This means hypothesis H1 is rejected. The size of the board has no effect on the design of carbon emissions. This shows that the size of the board of commissioners in a company cannot be a relevant factor for carbon emissions. This is because the average respondents from the observed companies have a relatively small board of commissioners and carbon emissions with minimal average values so that the scores have no effect and the proof of the theory is not achieved. The agency theory (Jensen and Meckling 1976) states that the agent has more information than the principal, so that the agent acts in the interests of the principal, supervision is needed to overcome agency problems. The Board of Commissioners as supervisor is a mechanism in governance that functions to provide guidance and direction to company managers (Rahmawati, *et al*, 2017). The inclusion of more boards could increase the board's monitoring capacity and ability to promote value-creating activities. Therefore, to increase firm value, firms with larger boards may be more inclined to address issues related to carbon emission disclosure (Kılıç and Kuzey 2019). In line with the research of Al-Qahtani & Elgharbawy, (2020) and Akbaş & Canikli, (2018) Herlina & Juliarto, (2019) Niza & Ratmono, (2019) stated that the size of the board of commissioners has no significant effect on the disclosure of carbon emissions because the size of the board of the observed object is relatively small compared to other countries. Different from research by Iredele & Moloi, (2020), Iswati & Setiawan, (2020), Nasih *et al*, (2019) and Yunus *et al*, (2016) which states that the size of the board of commissioners has a significant effect on the disclosure of carbon emissions.

The results of the regression hypothesis test (H2) obtained by the independent board of commissioners on carbon emissions disclosure in the t-test obtained a significant p-value of 0.0092 which is smaller than $= 0.05$, so it can be concluded that BIND has influences on the disclosure of carbon emissions. This means that hypothesis H2 is accepted. The size of the board of commissioners does not have an effect on carbon emissions disclosure. The Independent Board of Commissioners influences the disclosure of carbon emissions. The increased percentage of board independent in a company will be made better to make a decision to disclose carbon emissions. Independent commissioners in supervising management will not only focus on profitability but also increase the value of the company in the long term. Therefore, independent commissioners with their independence are considered capable of maintaining transparency and disclosure of information for stakeholders and can expand the company's sensitivity in dealing with social demands, especially in responding to issues related to the environment (Trufvisa *et al*, 2019). This is in line with agency theory which states that corporate governance is effective, marked by the proportion of independent commissioners (Herlina & Juliarto, 2019). The existence of an independent commissioner in the company will encourage and create a more independent, objective climate and increase fairness as one of the main principles in paying attention to the interests of minority shareholders and ensuring the transparency and disclosure of the company's financial statements, including the disclosure of carbon emissions. This is in line with research Zanra *et al*, (2020), Ararat & Sayedy, (2019) stated that board independence is a significant predictor of climate change disclosure, Niza & Ratmono, (2019) and Krishnamurti & Velayutham, (2018) which states that the independent board of commissioners has a significant effect on the disclosure of carbon emissions. Different from research Nasih *et al*, (2019) Bui, Houqe, *et al*, (2020), (Kılıç and Kuzey 2019), and (Iswati & Setiawan, 2020) stated that the independent board of commissioners had no significant effect on the disclosure of carbon emissions. This shows that companies with a higher percentage of independent commissioners and directors are less likely to disclose information about carbon emissions. This finding implies that independent boards are more conservative in disclosing information related to carbon emissions to stakeholders as a whole. Given the situation in Indonesia, disclosure of carbon emissions is still voluntary.

The results of the regression hypothesis test (H3). Obtained by board gender on carbon emissions disclosure on the t-test obtained a significant p-value of 0.3374 which is greater than $= 0.05$, so it can be concluded that BGEN has no effect on the disclosure of carbon emissions. This means that hypothesis H3 is rejected. The gender diversity of the board of commissioners has no effect on the disclosure of carbon emissions. This shows that the gender diversity of commissioners has not been a relevant factor in the disclosure of carbon emissions. This is because gender diversity is still low in the board of commissioners in the observed companies so that the value

becomes unaffected and theoretical proof cannot be achieved. Agency theory says women are the best supervisors because they tend to be impartial (Ararat and Sayedy 2019). Based on the nature and assumption that women on boards are similar to the general population of women on supervisory boards Women are considered more ethical, risk-averse and long-term oriented (Ararat and Sayedy 2019). Women on the board increase the likelihood that the board understands the ethical and social demands of providing meaningful and transparent disclosure of greenhouse gas emissions This leads to a greater likelihood that companies with women on the board of directors have higher quality disclosures of greenhouse gas emissions (Hollindale *et al.*, 2019). This is in line with research according to Kılıç and Kuzey, (2019), Iredele and Moloi, (2020) stated that gender diversity is still low from the observed object so that the gender diversity of the board of commissioners cannot be a factor in carbon disclosure and does not significantly affect the disclosure of carbon emissions. In contrast to the research conducted by Ben-Amar, Chang and McIlkenny, (2017) states the likelihood of voluntary climate change disclosure increases with the percentage of women on the board. This is in line with research Al-Qahtani & Elgharbawy, (2020), Hollindale *et al.*, (2019), Hossain *et al.*, (2017) which state that the percentage of women on the board of commissioners has a significant effect on the disclosure of carbon emissions. Next Research Tingbani *et al.*, (2020) provide strong evidence for a strong positive relationship between voluntary disclosure of carbon emissions and gender diversity of the board of commissioners.

The results of the regression hypothesis test (H4) obtained that board nationality on carbon emissions disclosure in the t-test obtained a significant p-value of 0.5031 which is greater than $= 0.05$, so it can be concluded that BNAT has no effect on the disclosure of carbon emissions. This means that hypothesis H4 is rejected. The national diversity of the board of commissioners does no effect on carbon emissions disclosure. This shows that the national diversity of the board of commissioners has not been a relevant factor in the disclosure of carbon emissions. The results show that national diversity is still low in the board of commissioners in the observed companies so that the value becomes irrelevant and theoretical proof cannot be achieved. Agency theory states that the diversity of the board can have an impact on the disclosure of carbon emissions. The board of commissioners who have a diversity of nationalities will be under greater pressure from various stakeholders related to climate issues and global warming. Because this can make companies with various nationalities the board of commissioners will tend to disclose information related to carbon (Herlina and Juliarto 2019). The diverse board of directors represents different expertise and industry backgrounds which in some way make a unique contribution to strategic decision making. National diversity is characterized by the presence of the board of commissioners in the meeting room which can influence the decision-making process and diverse groups can produce maximum decisions (Pechersky 2016). This is in line with research Trufvisa *et al.*, (2019), (Herlina & Juliarto, (2019) which states that the national diversity of the board of commissioners has no effect on carbon emissions disclosure. This is because the Indonesian government has ratified several policies related to climate change. The presence or absence of national diversity does not affect the decision to disclose carbon emissions. Different from research Kılıç & Kuzey, (2019) stated that the diversity of nationalities of the board of commissioners has a significant effect on carbon emissions disclosure because heterogeneous board diversity brings different perspectives, ideas, and information into board discussions, and can increase the company's ability to reach more informed decisions better and more effective.

5. CONCLUSION, IMPLICATION, LIMITATION

Conclusions

This study aims to examine and analyze the characteristics of the board of commissioners on the disclosure of carbon emissions with the control variables of firm size, profitability, and leverage. Unit of analysis in manufacturing sector companies listed on the Indonesia Stock Exchange for the period 2017-2019. Based on the results of research by conducting regression analysis, the regression results show that only the board independence commissioners have a significant effect on the disclosure of carbon emissions, while other characteristics such as board size, gender diversity, and diversity of nationality have no significant effect on the disclosure of carbon emissions. This is because board size, board gender diversity and board nationality diversity on average of respondents from the observed companies are still relatively low, so the observed values are not influential so that they cannot support the existing theory.

Implication

This research is expected to be able to bring in input for academics, enrich theoretical knowledge and contribute ideas that can be used as reference material in subsequent developments. For companies, this research is expected to be able to consider the diversity and composition of the board of commissioners as an organ in corporate governance to improve the quality of monitoring and supervision of the company's operations and the quality of disclosure of Carbon Emission Disclosure through the Sustainability report. Especially for the Manufacturing sector which is an intensive carbon emitter this can support the government's role in reducing greenhouse gas emissions and tackling climate change. For investors, the disclosure of carbon emissions is expected to be a consideration for decisions in investing in companies with environmentally friendly technology and participating in overcoming the impacts of climate change risks. This research is expected to contribute to policy so that it becomes a reference for regulators in issuing policies in overcoming global climate change, especially for manufacturing companies, especially as intensive emitters.

Limitation

In this study, the first use only the characteristics of the board of commissioners as an independent variable so that the results of this study may not be comprehensive enough in describing corporate governance as a whole. Second, the object of this research is only the manufacturing sector companies; the disclosure of carbon emissions is only based on subjective assessments, so that the assessment results may vary. Based on these limitations, for further research it is recommended to add other independent variables and use a wider unit of analysis so that the information obtained in conducting research on carbon emission disclosure can be better.

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